Marine Environmental
Data Service

Location and Description of Marine Data to be included in the Canadian Marine Data Inventory System

MARTEC Limited
NORDCO Limited
MacLaren Plansearch Limited

CONTRACTOR REPORT NO. 5

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MARTEC Limited, Halifax, N.S.
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MacLaren Plansearch Limited, St. John's, Nfld.

DEPARTMENT OF FISHERIES AND OCEANS
OTTAWA, CANADA

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(1) MARTEC Ltd., Halifax, N.S. under DSS Contract OSZ80-00140
(2) NORDCO Ltd., St. John's, Nfld. under DSS Contract OSZ80-00141
(3) MacLaren Plansearch Ltd., St. John's, Nfld. under DSS Contracts OSZ80-00139 and OSZ81-00020

The contents of these reports are the responsibility of the contractors.

Scientific Authority - P.A. Bolduc, MEDS

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Abstract

In developing and loading the Canadian Marine Data Inventory (CAMDI) to be held in the Marine Environmental Data Service (MEDS), each of the contractors was asked to evaluate the CAMDI project as it was presented to them in the light of the experience gained in performing the actual work, and to produce recommendations as appropriate. Enclosed are the reports of the three different contractors working on CAMDI.

Résumé

Pour l'élaboration et le chargement du Répertoire canadien des données marines (CAMDI) qui se feront au Service des données sur le milieu marin (SDMM), chacun des entrepreneurs a été invité à évaluer le projet CAMDI tel qu'il leur a été présenté à la lumière de l'expérience acquise lors de l'exécution de tâches connexes, et à formuler, le cas échéant, des recommandations. Vous trouverez ci-joint les rapports des trois entrepreneurs travaillant séparément sur le CAMDI.

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MARTEC Limited

1.0 INTRODUCTION

The purpose of this work was to assist the Marine Environmental Data Services Branch, Department of Fisheries and Oceans, in locating and describing marine data to be included in the Canadian Marine Data Inventory (CAMDI) system. This included an evaluation of the functional concepts of the system.

The statement of work included the following:

(1) Assess requirements for inventorying, and produce a list of the units within the organization that should be inventoried and some measure of the volume of the data holdings of each.

(2) Complete as many CAMDI forms as can be completed according to priorities established in reviewing the results of (1) above with MEDS.

(3) Evaluate the CAMDI project in the light of the experience gained in (1) and (2), and produce recommendations as appropriate.

The organizations for which MARTEC was responsible were:

- MARTEC's own data holdings;
- Dalhousie University;
- DND - Halifax area;
- Ocean Chemistry Division, B.I.O.

2.0 INVENTORY REQUIREMENTS

The requirements for inventorying, a list of units within each organization that should be inventoried, and an estimate of the value of data holdings for each assigned organization were evaluated upon initial contact with each assigned organization.

The particulars associated with the initial estimates for each organization are summarized as follows:

(a) MARTEC Limited

- Main Contact - M.E. Coolen, Manager Ocean Engineering
- Type of Data - physical, chemical, biological
- Volume of Data - approximately 12 projects

(b) Dalhousie University

- Main Contact - R.O. Fournier, Chairman Department of Oceanography
- Type of Data - physical, chemical, biological
- Volume of Data - 12 data sets from approximately 12 staff members

(c) DND - Halifax Area

- Main Contact - K.M. MacDonald, Senior Staff Officer Environmental Services Maritime Command
- Type of Data
  - surface wave charts
  - XBT cruise data
  - sea surface temperature charts
- Volume of Data
  - 10,000 wave charts
  - 100 XBT cruises
  - 1,500 sea surface temperature charts

(d) Ocean Chemistry Division (B.I.O.)

- Main Contact - J.L. Barron, Chemical Oceanography Division
- Type of Data - chemical and some physical
- Volume of Data - appropriately 40 cruises, with about 10,000 samples/cruise

The above estimates were found to be realistic, with the exception of the Ocean Chemistry Division, B.I.O. The initial 40 cruises estimated did not include a substantial number of cruises in which smaller amounts of chemical data were collected in support of various oceanographic projects. These additional sets of cruise data were included in the inventory. They composed some 65 additional cruises. For all the cruises inventoried, not only the appropriate chemical data but also the various other data types (physical, etc.) were inventoried.

3.0 CAMDI FORMS COMPLETED

During this project all the assigned organizations were completed within the allotted time period and budget. After consultation with MEDS, the work was extended to include as many additional B.I.O. cruises as could be included based upon the time and budget constraints for the project. A summary of the CAMDI forms completed during the project is included here in Table 1.

TABLE 1

Summary of Completed CAMDI Forms

	Organization	Number of Forms[a]
(1)	MARTEC Limited	10
(2)	Dalhousie University	15
(3)	DND - Halifax Area	3
(4)	Ocean Chemistry Division, B.I.O.	104[b]
(5)	Additional B.I.O. Cruises	77[c]

Notes: (a) The number of forms as given indicates the number of input forms. Each input form contains several information forms (B, C, etc.), over 90 in one case.

(b) The number of Ocean Chemistry Division forms include all B.I.O. cruises containing chemical data to Cruise No. 80028 in 1980. Cruises identified by MEDS as already in the CAMDI System were excluded.

(c) The number of additional B.I.O. cruise forms include all other B.I.O. cruises from 1959 to Cruise Report Number 224 in 1968. Again, cruises identified by MEDS as already in the CAMDI System were excluded.

4.0 EVALUATION AND RECOMMENDATIONS

From the experience gained in inventorying the various organizations, and completing the required set of CAMDI forms, an initial evaluation can be made of the system.

The reporting form system was found to generally be quite adequate and did work well. The response to this program, from the various organizations inventoried by MARTEC, was generally favourable. In particular, some individuals were pleased that the inventory was concerned with information about their data (location, parameters, etc.) as opposed to obtaining the data directly to be included in a data bank system. Also, the individuals interviewed were pleased that the amount of time required on their part to have their data inventoried was able to be kept to a reasonable minimum. However, some scientists, working in highly specialized fields of study, did not see the overall CAMDI Program as particularly beneficial to them.

Based on the above comments and experience gained during this project, the following recommendations for consideration are made:

(1) The present CAMDI Program and basic method of implementation should be continued;

(2) MEDS should prepare a more detailed description of the CAMDI Program to be distributed to organizations to be inventoried, emphasizing the following points:

   (i) The inventory does not include obtaining the actual data;

   (ii) There are substantial benefits for all members of the Ocean Science Community, even for specialized researchers, from the implementation of this program;

(iii) The implementation of the program is such that there is virtually no inconvenience to organizations, or individuals, whose data are inventoried.

In addition to the above two recommendations, a minor change to the reporting forms should be considered. At present, on form "B" (Oceanographic Cruise Data) delineations between parameters, number of samples taken of a particular parameter, and the numbers of stations applicable to a particular parameter are not provided. For example, on a given cruise 450 stations may be occupied, some 4,000 samples of parameter A may be taken at all 450 stations, 2,000 samples of parameter B at only 100 stations, and 100 samples of parameter C at only 10 stations. Unless a separate form "B" is filled out for each parameter, the present form cannot show this type of detail.

Bearing the above in mind the following form change is recommended for consideration:

(3) On form "B" (Oceanographic Cruise Data) the space presently allocated for "Parameter and Instrument" should be adjusted to include also the number of stations and samples applicable to each parameter.

The final recommendation is associated with extending the organization list to include other data sources. We appreciate this is part of the MEDS plan for the CAMDI Program and have listed some organizations which should be considered for inclusion as the program expands. These other suggested organizations to inventory, that are in addition to the present CAMDI List of Laboratories and Agencies, are given here in Table 2.

TABLE 2

Suggested Organizations to Inventory

Organization	Main Data Types
Fisheries College of Cape Breton, N.S.	Fisheries, biological
University of New Brunswick, N.B.	Physical, chemical, fisheries, biological
Huntsman Marine Laboratory, N.B.	Fisheries, biological
University of Alaska, U.S.A.	Physical, chemical, biological
College Ste. Anne, N.S.	Biological
Acadia University, N.S.	Biological
St. Francis Xavier University, N.S.	Biological
Marine Sciences Research Laboratory, Nfld.	Biological

NORDCO Limited

1.0 INTRODUCTION

This report describes work commissioned by the Marine Environmental Data Services (MEDS) branch of the Department of Fisheries and Oceans to locate and describe marine data to be included in the Canadian Marine Data Inventory (CAMDI) system being developed by MEDS, and to evaluate the CAMDI project in the light of such work and produce recommendations as appropriate.

According to a letter to NORDCO from Mr. J.R. Wilson of MEDS, dated 16 January 1981, the responsibility of NORDCO was to inventory the physical and chemical oceanographic data holdings, excluding sea ice data, of Memorial University, C-CORE and NORDCO. Subsequent conversations with Mr. P.A. Bolduc of MEDS and Ms. J. Whittick of C-CORE led to the withdrawl of C-CORE from the list of organizations, since they are forwarding an inventory of their holdings directly to MEDS.

Other problems arose in the course of the work and these are discussed in the following section. Because of these problems, only fifteen CAMDI forms were completed by NORDCO. These forms have been forwarded to Mr. Bolduc at MEDS.

Section 3 of this report contains recommendations on the CAMDI project based on experiences in locating and identifying data.

2.0 WORK CARRIED OUT

The involvement of NORDCO in the CAMDI project began on 18 February 1981 when Mr. P.A. Bolduc and Mr. C. Glennie of MEDS arrived at NORDCO and gave instruction to Mr. B. Terry in the identification of data to be included in the inventory and in completing CAMDI forms.

It was decided to begin the work by taking an inventory of data holdings at NORDCO. An internal memo was circulated among several NORDCO staff members requesting their assistance in locating relevant data. Because NORDCO has no data archiving system, one is dependent on the memories of individuals involved in data collection and on descriptions of data contained in reports. Through responses to the aforementioned memo and through perusal of reports, several data sets were identified. Unfortunately, there were obstacles which prevented the inclusion of the bulk of this data in the inventory; namely, (1) a large amount of the data held by NORDCO does not come under either of the categories specified in Mr. Wilson's letter; (2) most of the data sets which were relevant are proprietary, and some owners of data refused to allow any mention of even the existence of their data. Mr. Bolduc of MEDS was contacted regarding (2) and decided that those companies which refused permission to include their data would be contacted directly by MEDS. Hopefully the NORDCO data which could not be described at this time will be input to CAMDI at a later date.

In an effort to locate oceanographic data held by Memorial University, contacts were made witht Dr. G.R. Peters of the Faculty of Engineering and Applied Science, Dr. W. Denner of the Department of Physics and Mr. R. Hooper of the Department of Biology. (The Chemistry Department at Memorial University does not collect or hold oceanographic data.) All three contacts stated that creating an inventory of data held by Memorial is a formidable task, due mainly to the fact that Memorial has no data archiving system and that data is usually collected for research purposes, disseminated throughout departments to individuals who use it in their research and then sometimes mislay or discard it or who cease employment at Memorial and take any data they hold with them. Given this situation, location of data was more difficult than anticipated. However, all three contacts

at Memorial were fully cooperative and gave freely of their time in searching through files and contacting colleagues to obtain cruise reports and descriptions of data which are accessible. Although several CAMDI forms were completed on data at Memorial, it is felt that much more information could be obtained if time were available.

3.0 RECOMMENDATIONS

In view of the problems described above, which hampered any substantial inventory of data holdings at Memorial University and NORDCO, the current approach to loading CAMDI should be reviewed, at least in its relation to marine consulting firms who handle proprietary data and to universities which do not have data archives.

Regarding the current project, the work should have included all data set categories, since the search for data uncovered many data sets which could have been included had there been no restriction to physical and chemical data. Any future efforts in obtaining data for CAMDI should cover all data set categories, and also should be preceeded by a wide publicizing of what CAMDI is and of its importance. This could be accomplished through local venues such as the local chapter of the Canadian Meteorological and Oceanographic Society, and through ocean-related publications.

The method of partially loading CAMDI by having holders of substantial amounts of data complete CAMDI forms on their holdings should be considered. For example one approach, suggested by a contact, to obtaining data held at Memorial University would be to contact the relevant departments and offer to underwrite the cost of hiring a student for one semester who would document and archive all data currently held by the department and complete CAMDI forms at the same time. This offer may be attractive to Memorial since they are in need of a data archival system and such an arrangement would provide the funds to develop one and probably a format (CAMDI) for documentation. In addition, some arrangement may be possible whereby information on new data acquisition would be transmitted to MEDS. The cost-effectiveness of such arrangments must, of course, be considered; their productivity seems assured.

In the case of marine consulting firms and possibly their industrial clients, one approach to obtaining information on data would be to negotiate a package price for the information based on the volume of holdings. Regular updates on information could also be negotiated. Those sources which are enthusiastic about CAMDI may

readily provide information at low cost; those sources reluctant to divulge information will present a problem regardless of the approach taken.

It is felt that these approaches would prove more effective than the current approach and so should be considered. In any event, NORDCO will certainly cooperate with MEDS in future in providing information for CAMDI.

MacLaren Plansearch Limited

(a) St. John's

1. INTRODUCTION

MacLaren Plansearch Limited was requested by the Marine Environmental Data Services Branch of Fisheries and Oceans to survey the Department of Fisheries and Oceans St. John's and MacLaren Plansearch Limited for all physical and chemical oceanographic data.

This report is an evaluation of the project in light of our experience and recommendations on the project based on this experience.

Our discussions with the Department of Fisheries and Oceans regarding the data holdings of St. John's indicated they had little data that had not been sent to MEDS.

However, once the surveying began we found:

(a) A large percentage of MEDS data required coding for biological parameters

(b) Many of the cruises were missing from MEDS altogether

(c) A large amount of data in the library publications was not in MEDS

Our surveyors had to cross reference the cruise reports, field sheets and computer printouts in order to bring together one CAMDI input sheet.

They also had to draw upon their own knowledge and experience in researching reports in the library for CAMDI input.

The MacLaren Plansearch surveyors are now completely familiar with the coding requirements and research techniques as a result of their participation in this study. They have developed a keen interest in this activity and an appreciation for the value of the function they have performed. Section 5 of this report lists other candidate areas for inventorying. MacLaren Plansearch would be most interested in continuing this work should MEDS extend its inventory project to include some or all of the potential sources listed. This first project has trained several individuals with relevant scientific backgrounds in this specialist area. MEDS would receive an even greater return on their investment by continuing to use these individuals on an expanded inventory project.

2. Suggested Improvements for Further Inventorying

2.1. Lists of all cruises and parameters observed held by MEDS should be provided at the start of a project such as this. We received only a subset of these and spent quite a lot of time coding data that was in another database. This work was not completely wasted as there were other parameters observed that MEDS did not have in their system.

2.2. The IHB zone map is too broad for nearshore or specific zone studies. i.e., Fortune Bay had to be coded as Grand Banks.

2.3. There should be a cross reference map for IHB zones and ICNAF zones. Many studies refer to ICNAF zones only.

2.4 The beginning and ending dates for cruises often conflict. Depending on which reports are referenced the start and end dates are from port or from the first and last station.

2.5 Specific stations are visited on every cruise (i.e., Station 27). Frequently the data is in MEDS for Station 27 but not for the remainder of the cruise.

2.6. The differences between a B sheet and an F sheet are confusing. It would be better if all cruise data used a B form with a parameter added stating type of cruise (i.e., oceanographic, biological, etc.).

2.7. The originator's identification of the cruise should be maintained in the database along with the MEDS cruise number. In the regions all the data is stored by the regions originator ID (not the MEDS cruise number).

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2.8 The parameter list for the F forms should be modified for broader studies. For example, we must use more than one F form for an environmental cruise as it spans Biological Oceanography, Chemical Oceanography, etc.

2.9. Definitions of some of the parameters should be firmed up. For example, using St. John's Fisheries and Oceans Terminology cod caught offshore is "demersal" and caught inshore is "pelagic".

2.10. In some of the studies, grabs are collected and then analysis is performed for carbon, hydrogen, etc. The parameters for coding are SEDIMENT, C, H, etc. In reality these parameters are not the same level. One is a technique whereas the others are analyses.

2.11. Other parameters should be added such as:

Algae (should be separate from plants)
Larval Measurements
Blood analysis
Gut content analysis
Plankton - (often the sheets indicate a Plankton tow was taken but we cannot find out whether and how it was analysed).
C14
Squid
Feeding
Fecundity
Age Analysis
Sex Ratios
Tides
Bottom type
Light - no explanation of what it means

2.12. When coding an F form often more than one phenomeunum was associated with a date set catagory (i.e., Physical Oceanography - Sea Ice, Circulation).

2.13. Parameter description should be added to B form.

2.14. It would be helpful to have a list and description of instruments used for each of the parameters.

3 Biological Data Collection

Biological data can be collected with minor modifications to the existing forms.

The B form should be modified to allow th coder to input the type of cruise (i.e., biological vs. oceanographic).

The parameter list should be expanded as suggested in number 2.14. above. Also, all the data set types and phenomena used for F cruises should be available as parameters on the B form parameter list.

4. Future Input for CAMDI

As MEDS has indicated, a major problem with this type of data-base is maintaining its completeness.

The input for CAMDI comes from the public and private sector. Within the Department of Fisheries and Oceans, MEDS can appoint divisions responsible for CAMDI input. To ensure completeness the librarian of each station should also screen incoming reports for possible entry into CAMDI.

In order to encourage the private sector to support CAMDI via inputting appropriate studies MacLaren Plansearch proposes a marketting scheme for the database. Companies that have already been inventoried should be given a marketting seminar on the use and benefits of the system. Perhaps MEDS should set up a "hot line" desk where requests for information can be channelled. A guarantee of one week turnaround of requests and a discount on processing charges could be offered to active CAMDI users (i.e., those companies who continue to maintain the database with new input).

We realize that this is not a fool proof method but without legislation requiring all data to be sent to MEDS it is difficult to guarantee the continuing co-operation of private firms.

5. New Areas for Inventorying

The following institutes may have important data for the CAMDI System.

Memorial University of Newfoundland
St. Andrew's Biological Station (including Ellerslie)
Provincial Department of Fisheries - Newfoundland
- Prince Edward Island
- New Brunswick
- Nova Scotia

Huntsman Marine Laboratory
Marine Laboratory of Newfoundland
Lavalin Group - Fenco
- Geocon
- National Sanding and Boring
- Econosult
- Andre Marsan et Associates
- Bay James

It would also be worth inquiring whether the several Atlantic Provinces Fisheries Colleges and the Canadian Coast Guard have any significant data sets.

MacLaren Plansearch Limited would be pleased to carry out the surveying at any of the above institutions. As this company is owned by the Lavalin Group we would be assured of co-operation in surveying other Lavalin companies. As discussed with MEDS, we are including in this report an estimate for surveying St. Andrews. (Appendix A).

MacLaren Plansearch Limited

(b) St. Andrews

Introduction

MacLaren Plansearch Limited was requested by the Marine Environmental Data Services Branch of Fisheries and Oceans to survey all physical and chemical oceanographic data of the St. Andrews Biological Station of the Department of Fisheries and Oceans.

This report evaluates the project in light of our experience and sets forth our recommendations.

We would like to point out that although the subject matter appears to be very dry, there is humour in historical scientific data. An example of this is a description of the winds from a cruise on Hudson Bay:

> "a steady uniform wind (normal to the paper, towards the reader) blowing in a constant direction everywhere."

MacLaren Plansearch Limited would be most interested in continuing this work should MEDS extend its inventory project. Our surveyors are completely familiar with the coding requirements and research techniques, having participated in two such studies.

COMMENTS

The following comments are based on our survey of the St. Andrews Biological Station, although some may have appeared in the March 1981 report of St. John's Biological Station's and MacLaren Plansearch Limited's data holdings.

1. The originator's identification of the cruise should be maintained in any database, along with the MEDS cruise number. It should be listed along with MEDS cruise numbers in inventory lists intended for the use of data surveyors.

2. Much of the research done has been around estuaries. Perhaps it would be appropriate to include a field for "estuarine study" on the forms and in the database.

3. There should be a cross reference map for IHB zones and ICNAF zones. Many studies refer to ICNAF zones only.

4. For some stations that are visited regularly (i.e., Prince 5 and 6) we can identify that data was entered for the station but are unable to tell if it is complete.

5. The differences between "B" and "F" forms are confusing. We recommend a new form be designed which is a composite of "B" and "F" forms. A parameter could be added stating type of cruise (e.g., physical oceanographic, biological, etc.).

6. Parameters should be added to the "F" form as follows:

   a) Size of benthic organisms, i.e., measuring scallops

   b) Fish chemistry

   c) Benthos - identification and counts

   d) Uptake of pollutants in fish

   e) Fish eggs - identification

   f) Larval - identification

   g) Larval - size

   h) Blood samples

   i) Age analysis

   j) Fish parasites - counts and identification

7. The forms did not allow for coding of fish collection method (e.g., otter trawl). These were placed in the remarks field.

8. Many of the studies were actually done in the laboratory. These were not included in the inventory.

9. Dr. Alan White informed the surveyors that many of the cruises at stations Prince 5 and 6 included phytoplankton analysis, and sediment and silica sampling. However, the surveyors could not find any such documentation and therefore did not include it.

10. Many of the papers we researched contained summaries of series of cruises. These were not coded as the data had already been captured for the individual cruises.

11. Dr. Alan White told the surveyors that, since 1977, stations from Prince 5 to Wolves Island and Heart Passage were measured for temperature, salinity, light (using submarine radiometer), depth, abundance of phytoplankton and zooplankton, and gut contents of benthos. He also stated that for the above area chemical and depth analysis were done in 1980 from the Pandalus and the Hart. However, as we could not obtain copies of any reports we were unable to code those data.

12. We were informed by senior personnel at St. Andrews that records of data going back to 1917 had been shipped from St. Andrews to Bedford Institute of Oceanography (BIO). These data should be surveyed when the project is expanded to include BIO.